REMARKS

Claims 1-6, 8-13, 16-28 and 33-35 are now pending in the application. By this paper, Claims 1, 2, and 16 have been amended and Claims 7, 31, 32, and 36 have been cancelled without prejudice or disclaimer of the subject matter contained therein. The basis for the foregoing amendments can be found throughout the specification, claims, and drawings originally filed. No new matter has been added. The preceding amendments and the following remarks are believed to be fully responsive to the outstanding Office Action and are believed to place the application in condition for allowance. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1 and 16 stand rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. Specifically, the Examiner asserts that the specification fails to provide support for "approximating" a temperature of a piezoelectric element based on a sensed temperature of a drive integrated circuit or approximating temperature of a diaphragm disposed adjacent to the piezoelectric element. The Examiner further asserts that the specification fails to provide support for "approximating" a temperature of discharge liquid disposed adjacent to a piezoelectric element based on an approximated temperature of a diaphragm or selecting between a normal drive signal and a cooling drive signal based on an approximated temperature of discharge liquid.

Applicants respectfully submit that the above rejections of independent Claims 1 and 16 are moot, as each of independent Claims 1 and 16 have been amended to incorporate elements specifically recited by the specification. Support for the foregoing amendments can be found at Paragraphs [0068] and [0075]. With regard to the Examiner's assertion that the specification fails to provide support for "selecting between a normal drive signal and a cooling drive signal" based on an "approximated" temperature of discharge liquid, Applicants direct the Examiner to the specification at Page 13, Paragraph [0062], which recites a control section (8a) that instructs a switching signal generator (33a) to select either a normal drive signal or a cooling drive signal based on a temperature detection signal.

Because independent Claims 1 and 16 now recite selecting between a normal drive signal and a cooling drive signal based on a detected temperature, Applicants respectfully submit that independent Claims 1 and 16 are in condition for allowance. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

REJECTION UNDER 35 U.S.C. § 102

Claims 1, 2, 5, 8, 16, 17, 20, 23, and 33-36 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kimura et al. (U.S. Pat. No. 6,386,672). This rejection is respectfully traversed.

Applicants respectfully submit that this rejection is moot with respect to Claim 36, as Claim 36 has been cancelled without prejudice or disclaimer of the subject matter contained therein. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

Independent Claim 1 recites a droplet discharging apparatus including a means for discharging a discharge liquid in the form of droplets through an aperture by mechanically deforming a piezoelectric element by a normal drive signal and a drive integrated circuit disposed adjacent to and in thermal contact with the piezoelectric element. A control unit selects between the normal drive signal and a cooling drive signal and supplies the selected normal drive signal or cooling drive signal to the drive integrated circuit. A substrate is attached to and is in thermal contact with the piezoelectric element and the drive integrated circuit and a diaphragm is disposed adjacent to and in thermal contact with the piezoelectric element. A temperature sensor is associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit. The sensed temperature of the drive integrated circuit reflects an operating heat of the piezoelectric element due to the piezoelectric element being thermally coupled to the drive integrated circuit via the substrate and also reflects the temperature of the discharge liquid due to the thermal connection of the discharge liquid, the diaphragm, the piezoelectric element, the substrate, and the drive integrated circuit. The control unit selects between the normal drive signal and the cooling drive signal based on the temperature of the discharge liquid, whereby the droplets are discharged from the aperture based on the selected normal drive signal or the cooling drive signal. A flushing process is implemented between cycles of normal discharge to set the temperature of the discharge liquid to a predetermined temperature. The flushing process includes selecting the cooling drive signal following each period of normal discharge to set the temperature of the discharge liquid to a predetermined temperature prior to initiating a subsequent normal discharge.

Independent Claim 16 recites a droplet discharging method including sensing a temperature of a drive integrated circuit disposed adjacent to and in thermal contact with a piezoelectric element, determining a temperature of a discharge liquid disposed adjacent to the piezoelectric element based on the detected temperature of the drive integrated circuit, and selecting between a normal drive signal and a cooling drive signal based on the temperature of the discharge liquid. The method further includes discharging the discharge liquid in the form of droplets through an aperture by mechanically deforming the piezoelectric element based on the selected normal drive signal or the cooling drive signal and selecting the cooling drive signal during a flushing process following each normal discharge of the discharge liquid. The discharge liquid is discharged by mechanically deforming the piezoelectric element based on the cooling drive signal during the flushing process to cool the discharge liquid prior to a subsequent normal discharge. The normal drive signal is selected following the flushing process.

Applicants respectfully submit that Kimura fails to disclose a droplet discharging apparatus or method including a control unit that selects between a normal drive signal and a cooling drive signal based on a sensed temperature of a drive integrated circuit, as Kimura fails to disclose selecting between a *pair* of signals. Applicants also submit that Kimura fails to disclose a flushing process including selecting a cooling drive signal following *each* period of normal discharge to set a temperature of a discharge liquid to a predetermined temperature prior to initiating a subsequent normal discharge.

Kimura discloses an ink jet recording head including a nozzle plate (3), a flow path forming substrate (7), a piezoelectric vibrator unit (8), and an elastic plate (10) that

are controlled based on a detected temperature of a semiconductor substrate (67). See Kimura at Col. 8, Ins. 5-13. Kimura discloses adjusting a level of a *single* drive signal based on a detected temperature of the substrate (67) and, therefore, fails to disclose selecting between a *pair* of signals. See Kimura at Col. 8, Ins. 5-13 and Ins. 40-57.

The Examiner asserts that Kimura discloses a flushing process at Col. 9, Ins. 25-41, as Kimura discloses reducing a level of a drive signal supplied to a piezoelectric vibrator unit (8) to reduce a temperature below a "basic level" (T1). See the Office Action mailed November 6, 2007 at Page 5. Kimura discloses monitoring an environmental temperature (T) of a substrate (67) and adjusting a level of the drive signal supplied to the piezoelectric vibrator unit (8) based on the environmental temperature (T). See Kimura at Col. 9, Ins. 16-41. While Kimura discloses *adjusting* a single drive signal based on a detected temperature of a substrate (67), Kimura fails to disclose selecting between a pair of drive signals, as recited by independent Claims 1 and 16. Furthermore, Applicants note that while Kimura discloses adjusting a drive signal based on a detected temperature of a substrate (67), Kimura fails to disclose selecting a cooling drive signal following <u>each</u> period of normal discharge to set a temperature of a discharge liquid to a predetermined temperature prior to initiating a subsequent normal discharge. Based on the disclosure of Kimura, as long as the environmental temperature (T) proximate to the substrate (67) is within an acceptable range, the drive signal supplied to the piezoelectric vibrators is not adjusted. In contrast, as recited by independent Claims 1 and 16, the control unit selects a cooling drive signal following <u>each</u> period of normal discharge prior to initiating subsequent normal discharge.

In light of the foregoing, Applicants respectfully submit that independent Claims 1 and 16, as well as Claims 2, 5, 8, 17, 20, 23, and 33-35, respectively dependent therefrom, are in condition for allowance. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 3 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. (U.S. Pat. No. 6,386,672) in view of Kubo (U.S. Pat. No. 6,257,688).

Claims 4 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. (U.S. Pat. No. 6,386,672) in view of Tajika (U.S. Pat. No. 5,861,895).

Claims 6 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. (U.S. Pat. No. 6,386,672) in view of Nozawa (U.S. Pat. No. 6,499,821).

Claims 7 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. (U.S. Pat. No. 6,386,672) in view of Mikami (U.S. Pat. No. 4,633,269).

Claims 9, 11-13, 24 and 26-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. (U.S. Pat. No. 6,386,672) in view of Usui et al. (U.S. Pat. No. 6,981,761).

Claims 10 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura et al. (U.S. Pat. No. 6,386,672) in view of Shinoura (U.S. Pat. No. 6,714,173).

Claims 31 and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kimura (U.S. Pat. No. 6,386,672) in view of Ishizaki (U.S. Pat. No. 6,454,377).

These rejections are respectfully traversed.

Applicants respectfully submit that these rejections are moot with respect to Claims 7, 31, and 32, as Claims 7, 31, and 32 have been cancelled without prejudice or disclaimer of the subject matter contained therein. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

Independent Claims 1 and 16 are believed to be in condition for allowance in light of the foregoing remarks. Because Claims 3, 4, 6, 9-13, 18, 19, 21, 22, and 25-28 respectively depend from independent Claims 1 and 16, Claims 3, 4, 6, 9-13, 18, 19, 21, 22, and 25-28 are similarly believed to be in condition for allowance. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner

believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: January 30, 2008

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